

EXHIBIT E

LITHIUMHUB’S INFRINGEMENT ANALYSIS

U.S. Patent No. 9,954,207 – LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery

Independent Claims 1 and 12


LithiumHub provides evidence of infringement of independent claims 1 and 12 of U.S. Patent No. 9,954,207 (hereinafter “the ’207 patent”) by LiTime. In support thereof, LithiumHub provides the following claim charts.

“Accused Products” as used herein refers to at least LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery and the Accused Products enumerated in the Complaint. These claim charts demonstrate LiTime’s infringement by comparing each element of the asserted claims to corresponding components, aspects, and/or features of the Accused Products. These claim charts are not intended to constitute an expert report on infringement. These claim charts include information provided by way of example, and not by way of limitation.




Unless otherwise noted, LithiumHub contends that LiTime directly infringes the ’207 patent in violation of 35 U.S.C. § 271(a) by selling, offering to sell, making, using, and/or importing the Accused Products. The following exemplary analysis demonstrates that infringement. Unless otherwise noted, LithiumHub further contends that the evidence below supports a finding of indirect infringement under 35 U.S.C. §§ 271(b) and/or (c), in conjunction with other evidence of liability under one or more of those subsections. LiTime makes, uses, sells, imports, or offers for sale in the United States, or has made, used, sold, imported, or offered for sale in the past, without authority, or induces others to make, use, sell, import, or offer for sale in the United States, or has induced others to make, use, sell, import, or offer for sale in the past, without authority products, equipment, or services that infringe claims 1 and 12 of the ’207 patent, including without limitation, the Accused Products.

Unless otherwise noted, LithiumHub believes and contends that each element of each claim asserted herein is literally met through LiTime’s provision of the Accused Products. However, to the extent that LiTime attempts to allege that any asserted claim element is not literally met, LithiumHub believes and contends that such elements are met under the doctrine of equivalents. More specifically, in its investigation and analysis of the Accused Products, LithiumHub did not identify any substantial differences between the elements of the patent claims and the corresponding features of the Accused Products, as set forth herein. In each instance, the identified feature of the Accused Products performs at least substantially the same function in substantially the same way to achieve substantially the same result as the corresponding claim element.

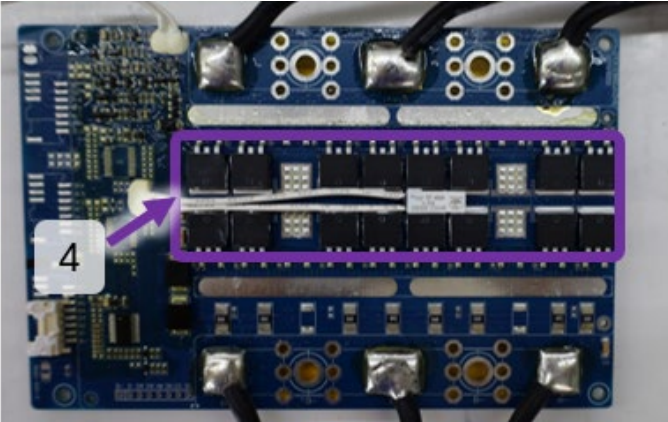

To the extent the chart of an asserted claim relies on evidence about certain specifically identified Accused Products, LithiumHub asserts that, on information and belief, any similarly functioning Accused Product also infringes the charted claim. LithiumHub reserves the right to amend this infringement analysis based on other products made, used, sold, imported, or offered for sale by LiTime. LithiumHub further reserves the right to amend this infringement analysis by adding, subtracting, or otherwise modifying content in the “Accused Products” column of each chart.


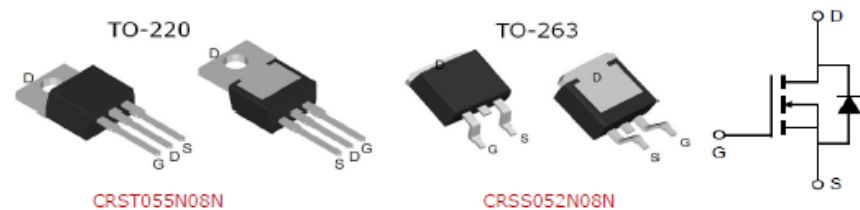
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|--|
| Claim 1 | |
| <p>[1p]</p> <p>A battery pack having positive and negative terminals for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system, said battery pack comprising:</p> | <p>To the extent the preamble is limiting, the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery is a battery pack having positive and negative terminals.</p>  <p>To the extent the preamble is limiting, the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery may be used for powering an electric motor for starting an internal combustion engine in which the electric motor is in a 6 volt to 48 volt operating system.</p> |


| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery | | | | | | | | | | | | | | | | | | |
|-------------------------------------|---|------------|-------------------|-----------|---------|-------------|---|------------------|-------|-----------------|-------|---------|--------|-------------------------------------|------|----------------------|-------|-----------------|---------------------------|
| | <div>      </div> <div> <p>⚡ [Extra 5% Flash Sale] LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery ★★★★★ 41 reviews</p> </div> <div> <p>Affordable BCI group 24 deep cycle battery, Compatible with All Types of RVs on the Market</p> <ul style="list-style-type: none"> • 2/3 Lighter, 1/4 Smaller, 2X energy of 12V100Ah Lead-Acid battery • 1280Wh of Energy, 1280W of Output Power • 8X Higher Mass Energy Density (60.95Wh/lbs VS. 7.23Wh/lbs of Group 24 AGM Battery) • EV Grade-A Cells, 4000+ cycles @100%DOD • LiTime's 100A BMS (over-charging, over-discharging, over-current, over-temperature, and short-circuit protection) • 100A Continuous Discharge/Charge Current, 400A/1S Continuous Discharge Current • 10+ Years Lifespan & 5 Years Warranty • 20.48kWh Expandable Energy (Max. 4P4S) • 10X Charging Efficiency, 2X Operating Time • Suitable for RVs/Camping/Trolling Motor/Lawnmower/Solar/Home Storage/Off-grid • IP65 Waterproof • Clean/Eco-friendly/Cost-effective • Fast Delivery & Excellent Service • Low TCO & Zero Maintenance Fee </div> <div> <p>SPECS</p> </div> <div> <p>BATTERY</p> </div> <div> <table> <tr> <td>Cell Type:</td><td>LiFePO4 Prismatic</td></tr> <tr> <td>Warranty:</td><td>5 Years</td></tr> <tr> <td>Cycle Life:</td><td>4000 cycles at 100% DOD, 6000 cycles at 80% DOD, 15,000 cycles at 60% DOD</td></tr> <tr> <td>Nominal Voltage:</td><td>12.8V</td></tr> <tr> <td>Rated Capacity:</td><td>100Ah</td></tr> <tr> <td>Energy:</td><td>1280Wh</td></tr> <tr> <td>Max. Expansion (Parallel & Series):</td><td>4P4S</td></tr> <tr> <td>Internal Resistance:</td><td>≤40mΩ</td></tr> <tr> <td>Certifications:</td><td>UL, FCC, CE, RoHS, UN38.3</td></tr> </table> </div> <div> <p>Source: https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p> </div> | Cell Type: | LiFePO4 Prismatic | Warranty: | 5 Years | Cycle Life: | 4000 cycles at 100% DOD, 6000 cycles at 80% DOD, 15,000 cycles at 60% DOD | Nominal Voltage: | 12.8V | Rated Capacity: | 100Ah | Energy: | 1280Wh | Max. Expansion (Parallel & Series): | 4P4S | Internal Resistance: | ≤40mΩ | Certifications: | UL, FCC, CE, RoHS, UN38.3 |
| Cell Type: | LiFePO4 Prismatic | | | | | | | | | | | | | | | | | | |
| Warranty: | 5 Years | | | | | | | | | | | | | | | | | | |
| Cycle Life: | 4000 cycles at 100% DOD, 6000 cycles at 80% DOD, 15,000 cycles at 60% DOD | | | | | | | | | | | | | | | | | | |
| Nominal Voltage: | 12.8V | | | | | | | | | | | | | | | | | | |
| Rated Capacity: | 100Ah | | | | | | | | | | | | | | | | | | |
| Energy: | 1280Wh | | | | | | | | | | | | | | | | | | |
| Max. Expansion (Parallel & Series): | 4P4S | | | | | | | | | | | | | | | | | | |
| Internal Resistance: | ≤40mΩ | | | | | | | | | | | | | | | | | | |
| Certifications: | UL, FCC, CE, RoHS, UN38.3 | | | | | | | | | | | | | | | | | | |

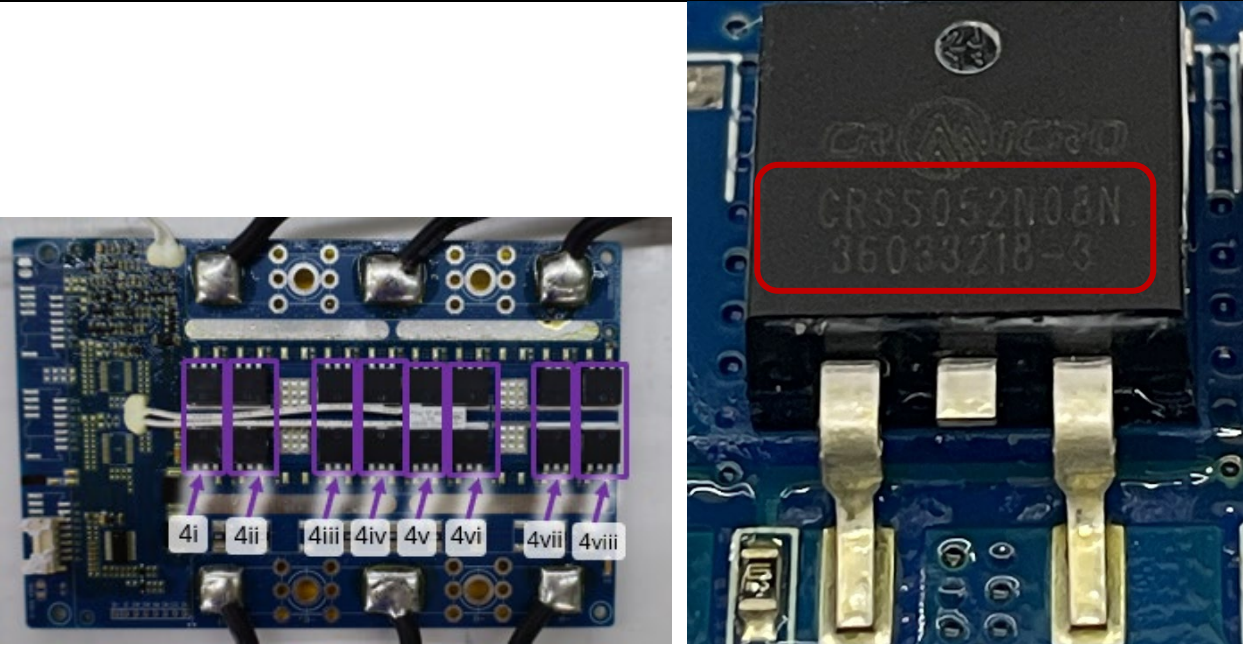
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---|--|
| |  |
| <p>[1a] a battery pack housing;</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes a battery pack housing.</p> <div>  </div> <div>  </div> |


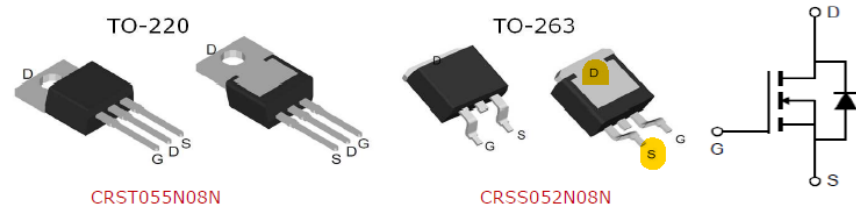
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---|--|
| <p>[1b] at least one lithium-based rechargeable cell within said housing; and</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes at least one lithium-based rechargeable cell within the housing.</p> <p>EV Grade-A LFP Cells, Accompany You Over 10+ Years</p> <p>LiTime battery insists on using automotive quality LiFePO4 prismatic cells across its lithium battery portfolio. With the LiTime top-grade EV lithium iron phosphate cells, you can feel confident LiTime 12V 100Ah group 24 lithium battery will faithfully serve your energy needs for over 10 years. These eco-friendly cells have undergone rigorous testing to prove their exceptional strength and stability and can charge over 4000 life cycles at 100% DOD.</p>  <p>Source: https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p>  |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|---|
| <p>[1c-i] a solid state switching apparatus comprising a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches,</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes a solid state switching apparatus (4).</p> <div></div> <div></div> |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery | | | | | | |
|---------------------------|---|----------|-----|--------------|-------|-------|------|
| | <div>  <p>华润微电子(重庆)有限公司</p> </div> <div> <p>CRST055N08N, CRSS052N08N</p> </div> <div> <p>SkyMOS1 N-MOSFET 85V, 4.6mΩ, 120A</p> </div> <div> <p>Features</p> </div> <div> <ul style="list-style-type: none"> • Uses CRM(CQ) advanced SkyMOS1 technology • Extremely low on-resistance $R_{DS(on)}$ • Excellent $Q_g \times R_{DS(on)}$ product(FOM) • Qualified according to JEDEC criteria </div> <div> <p>Product Summary</p> </div> <div> <table border="1"> <tr> <td>V_{DS}</td><td>85V</td></tr> <tr> <td>$R_{DS(on)}$</td><td>4.6mΩ</td></tr> <tr> <td>I_D</td><td>120A</td></tr> </table> </div> <div> <p>Applications</p> </div> <div> <ul style="list-style-type: none"> • Motor control and drive • Battery management • UPS (Uninterruptible Power Supplies) </div> <div> <p><i>100% Avalanche Tested</i></p> </div> <div>  </div> <div> <p>Source: https://www.lcsc.com/datasheet/lcsc_datasheet_2304140030_CRMICRO-CRSS052N08N_C410924.pdf</p> </div> <div> <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery comprises a plurality of pairs of solid state switches (4) with one pair of solid state switches connected in a parallel configuration (4i-4viii) to another pair of solid state switches.</p> </div> | V_{DS} | 85V | $R_{DS(on)}$ | 4.6mΩ | I_D | 120A |
| V_{DS} | 85V | | | | | | |
| $R_{DS(on)}$ | 4.6mΩ | | | | | | |
| I_D | 120A | | | | | | |

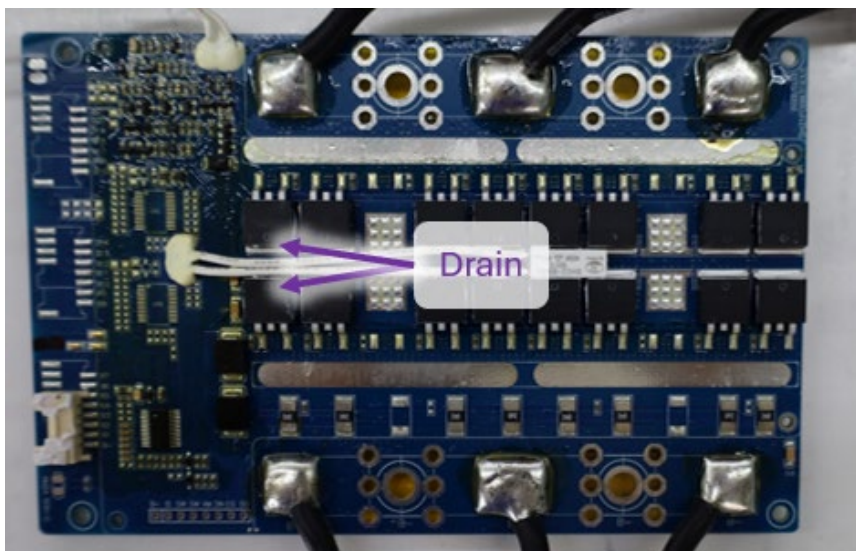
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|---|
| |  |
| [1c-ii] each switch having a source and a drain, the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected | Each switch (4) of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery has a source and a drain, the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected. |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|--|
| sources of the switches are connected, and |  <p>The image consists of two photographs of a lithium battery management system (BMS) circuit board. The left photograph shows a row of eight MOSFETs, each labeled with a reference numeral (4i, 4ii, 4iii, 4iv, 4v, 4vi, 4vii, 4viii). Each MOSFET is highlighted with a purple rectangular box, and arrows point to the gate driver circuitry for each. The right photograph is a close-up of one of the MOSFETs, showing its part number CRSS052N08N and date code 36033218-3 highlighted in a red rectangular box.</p> |

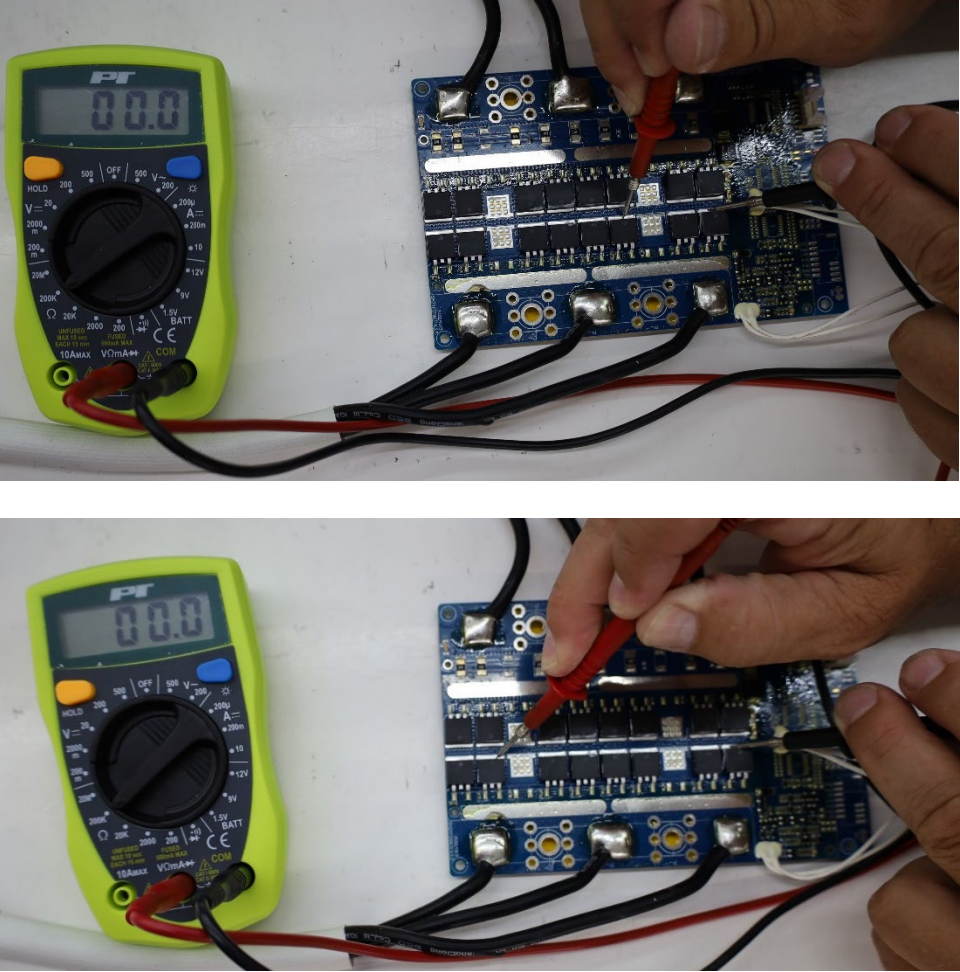
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|---------------------------|--|----------|-----|--------------|-------|-------|------|
| | <div>  <p>华润微电子(重庆)有限公司</p> </div> <div> <p>CRST055N08N, CRSS052N08N</p> </div> <div> <p>SkyMOS1 N-MOSFET 85V, 4.6mΩ, 120A</p> </div> <div> <p>Features</p> </div> <div> <ul style="list-style-type: none"> • Uses CRM(CQ) advanced SkyMOS1 technology • Extremely low on-resistance $R_{DS(on)}$ • Excellent $Q_g \times R_{DS(on)}$ product(FOM) • Qualified according to JEDEC criteria </div> <div> <p>Product Summary</p> </div> <div> <table border="1"> <tr> <td>V_{DS}</td><td>85V</td></tr> <tr> <td>$R_{DS(on)}$</td><td>4.6mΩ</td></tr> <tr> <td>I_D</td><td>120A</td></tr> </table> </div> <div> <p>Applications</p> </div> <div> <ul style="list-style-type: none"> • Motor control and drive • Battery management • UPS (Uninterruptible Power Supplies) </div> <div> <p><i>100% Avalanche Tested</i></p> </div> <div>  </div> <div> <p>Source: https://www.lcsc.com/datasheet/lcsc_datasheet_2304140030_CRMICRO-CRSS052N08N_C410924.pdf</p> </div> <div> <p>The switches of a pair of solid state switches (4) of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery are configured such that the drains of the switches are connected.</p> </div> | V_{DS} | 85V | $R_{DS(on)}$ | 4.6mΩ | I_D | 120A |
| V_{DS} | 85V | | | | | | |
| $R_{DS(on)}$ | 4.6mΩ | | | | | | |
| I_D | 120A | | | | | | |

US9,954,207 Claim Element

LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery







For example, as demonstrated by testing the electrical continuity using a multimeter, the drains of the switches of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery are connected, as shown by the nominal resistance measured between the drains of opposed MOSFETs.

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---|---|
| |  |
| <p>[1c-iii] said parallel configuration being connected with one or more cells between the positive and negative terminals,</p> | <p>The parallel configuration of solid state switches (4) of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery are connected in series with the one or more cells (7) between the positive (10) and negative terminals (11) of the battery pack.</p> |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---|---|
| | <p>The left photograph shows the battery pack with a blue PCB and a yellow multimeter. The right photograph is a close-up of the PCB with callouts: 'Connects to the negative terminal' (blue arrow) and 'Connects to the positive terminal' (red arrow).</p> |
| <p>[1d] wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.</p> | <p>The total discharging amount of each lithium-based cell in the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery is from 3 Ah to 2000 Ah (e.g, 4.0Ah), and the charging voltage per one cell is from 2.0 to 4.2 V (e.g., 3.3V).</p> |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---------------------------|--|
| | <div>    </div> <div> <p>⚡ [Extra 5% Flash Sale] LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery ★★★★★ 41 reviews</p> <p>Affordable BCI group 24 deep cycle battery. Compatible with All Types of RVs on the Market</p> <ul style="list-style-type: none"> • 2/3 Lighter, 1/4 Smaller, 2X energy of 12V100Ah Lead-Acid battery • 1280Wh of Energy, 1280W of Output Power • 8X Higher Mass Energy Density (60.95Wh/lbs VS. 7.23Wh/lbs of Group 24 AGM Battery) • EV Grade-A Cells, 4000+ cycles @100%DOD • LiTime's 100A BMS (over-charging, over-discharging, over-current, over-temperature, and short-circuit protection) • 100A Continuous Discharge/Charge Current, 400A/1S Continuous Discharge Current • 10+ Years Lifespan & 5 Years Warranty • 20.48kWh Expandable Energy (Max. 4P4S) • 10X Charging Efficiency, 2X Operating Time • Suitable for RVs/Camping/Trolling Motor/Lawnmower/Solar/Home Storage/Off-grid • IP65 Waterproof • Clean/Eco-friendly/Cost-effective • Fast Delivery & Excellent Service • Low TCO & Zero Maintenance Fee </div> <p><i>Source:</i> https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p> <div>  </div> |
| Claim 12 | |

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|--|--|------------|-------------------|-----------|---------|-------------|---|-------------------------|--------------|-----------------|-------|---------|--------|-------------------------------------|------|----------------------|-------|-----------------|---------------------------|
| <p>[12p] A deep cycle battery having positive and negative terminals in a 6 volt to 800 volt operating system, comprising:</p> | <p>To the extent the preamble is limiting, the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery is a deep cycle battery having positive and negative terminals in a 6 volt to 800 volt operating system.</p> <div>  </div> <div> <p>⚡ 【Extra 5% Flash Sale】 LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery ★★★★★ 41 reviews</p> <p>Affordable BCI group 24 deep cycle battery, Compatible with All Types of RVs on the Market</p> <ul style="list-style-type: none"> • 2/3 Lighter, 1/4 Smaller, 2X energy of 12V100Ah Lead-Acid battery • 1280Wh of Energy, 1280W of Output Power • 8X Higher Mass Energy Density (60.95Wh/lbs VS. 7.23Wh/lbs of Group 24 AGM Battery) • EV Grade-A Cells, 4000+ cycles @100%DOD • LiTime's 100A BMS (over-charging, over-discharging, over-current, over-temperature, and short-circuit protection) • 100A Continuous Discharge/Charge Current, 400A/1S Continuous Discharge Current • 10+ Years Lifespan & 5 Years Warranty • 20.48kWh Expandable Energy (Max. 4P4S) • 10X Charging Efficiency, 2X Operating Time • Suitable for RVs/Camping/Trolling Motor/Lawnmower/Solar/Home Storage/Off-grid • IP65 Waterproof • Clean/Eco-friendly/Cost-effective • Fast Delivery & Excellent Service • Low TCO & Zero Maintenance Fee </div> <div> <p>SPECS</p> </div> <div> <p>BATTERY</p> </div> <table border="1"> <tbody> <tr> <td>Cell Type:</td><td>LiFePO4 Prismatic</td></tr> <tr> <td>Warranty:</td><td>5 Years</td></tr> <tr> <td>Cycle Life:</td><td>4000 cycles at 100% DOD, 6000 cycles at 80% DOD, 15,000 cycles at 60% DOD</td></tr> <tr> <td>Nominal Voltage:</td><td>12.8V</td></tr> <tr> <td>Rated Capacity:</td><td>100Ah</td></tr> <tr> <td>Energy:</td><td>1280Wh</td></tr> <tr> <td>Max. Expansion (Parallel & Series):</td><td>4P4S</td></tr> <tr> <td>Internal Resistance:</td><td>≤40mΩ</td></tr> <tr> <td>Certifications:</td><td>UL, FCC, CE, RoHS, UN38.3</td></tr> </tbody> </table> <p>Source: https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p> | Cell Type: | LiFePO4 Prismatic | Warranty: | 5 Years | Cycle Life: | 4000 cycles at 100% DOD, 6000 cycles at 80% DOD, 15,000 cycles at 60% DOD | Nominal Voltage: | 12.8V | Rated Capacity: | 100Ah | Energy: | 1280Wh | Max. Expansion (Parallel & Series): | 4P4S | Internal Resistance: | ≤40mΩ | Certifications: | UL, FCC, CE, RoHS, UN38.3 |
| Cell Type: | LiFePO4 Prismatic | | | | | | | | | | | | | | | | | | |
| Warranty: | 5 Years | | | | | | | | | | | | | | | | | | |
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| Nominal Voltage: | 12.8V | | | | | | | | | | | | | | | | | | |
| Rated Capacity: | 100Ah | | | | | | | | | | | | | | | | | | |
| Energy: | 1280Wh | | | | | | | | | | | | | | | | | | |
| Max. Expansion (Parallel & Series): | 4P4S | | | | | | | | | | | | | | | | | | |
| Internal Resistance: | ≤40mΩ | | | | | | | | | | | | | | | | | | |
| Certifications: | UL, FCC, CE, RoHS, UN38.3 | | | | | | | | | | | | | | | | | | |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
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| <p>[12a] a battery pack housing;</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes a battery pack housing.</p> <div>  </div> <div>  </div> |

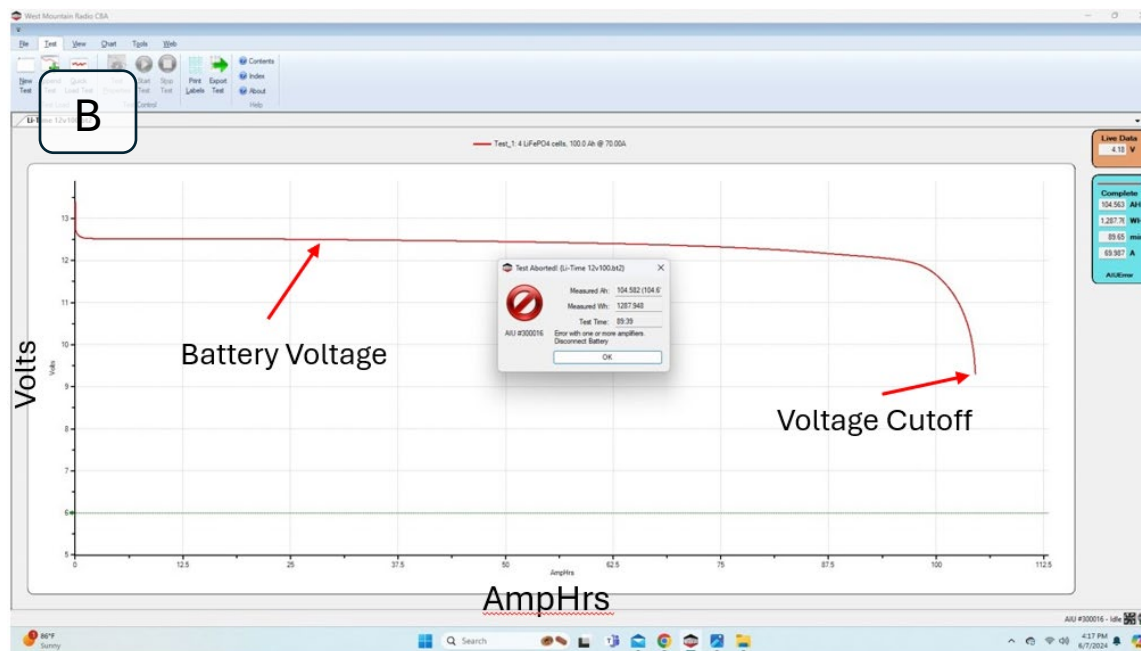
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| <p>[12b] at least one lithium-based rechargeable cell within said housing;</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes at least one lithium-based rechargeable Cell within said housing.</p> <p>EV Grade-A LFP Cells, Accompany You Over 10+ Years</p> <p>LiTime battery insists on using automotive quality LiFePO4 prismatic cells across its lithium battery portfolio. With the LiTime top-grade EV lithium iron phosphate cells, you can feel confident LiTime 12V 100Ah group 24 lithium battery will faithfully serve your energy needs for over 10 years. These eco-friendly cells have undergone rigorous testing to prove their exceptional strength and stability and can charge over 4000 life cycles at 100% DOD.</p>  <p>Source: https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p>  |

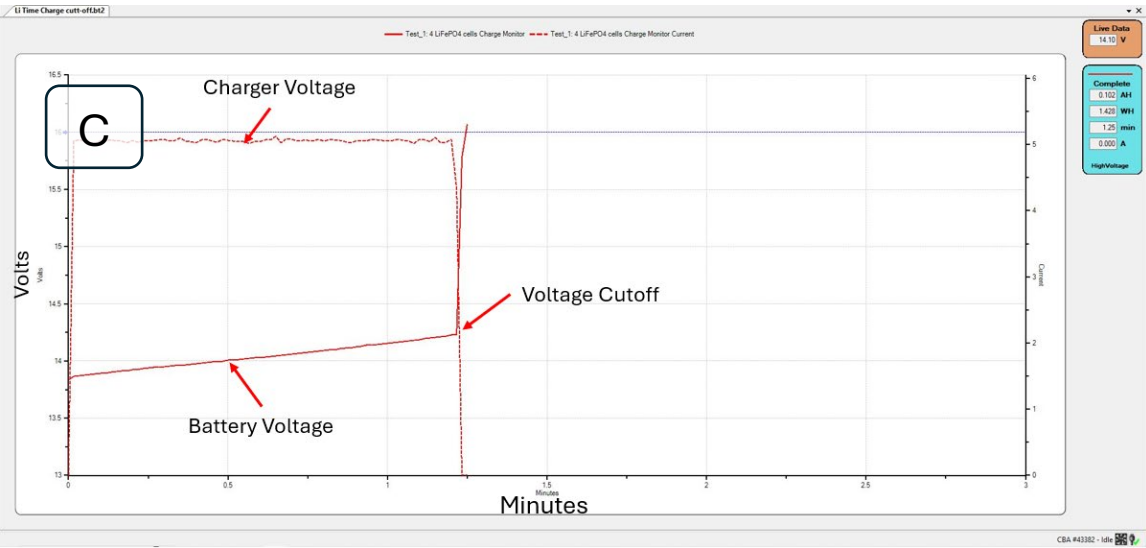
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|---|
| <p>[12c] a battery management system including a processor and a circuit board which protects from one of overvoltage, undervoltage, reverse polarity, short circuit, and extremes of temperature;</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes a battery management system including a processor (3) and a circuit board (2).</p> <div>  </div> <div>  </div> <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery protects from one of overvoltage, undervoltage, reverse polarity, short circuit, and extremes of temperature. For example, the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes thermal protection sensors to protect against operation during extreme temperature conditions.</p> |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---------------------------|--|
| | <p>Power through Any Task with LiTime BMS</p> <p>Featuring a 100A BMS, the LiTime 12V 100Ah group 24 lithium battery delivers unwavering power equal to life's most demanding duties. Its powerful BMS allows the stable operation of energy-intensive devices without constraint. Advanced protections against over-charging, over-discharging, over-current, overheating and short-circuit safeguard both users and the internal chemistry from harm. You can depend on consistent electricity no matter the application or conditions. A 3% ultra-low self-discharging rate can reduce your maintenance fee, demining your cost as much as possible.</p>  <p>Source: https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p>  <p>Also, for example, as demonstrated by connecting the battery terminals of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery to a computerized battery analyzer (<i>see</i> photo A below), the protection circuitry is demonstrated for an undervoltage condition by the termination of electrical current when the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery was discharged below its rated voltage (<i>see</i> photo B below). Similarly, the protection circuitry is demonstrated for an overvoltage condition by the termination of electrical current when the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery was charged above its rated voltage (<i>see</i> photo C below).</p> |

US9,954,207 Claim Element

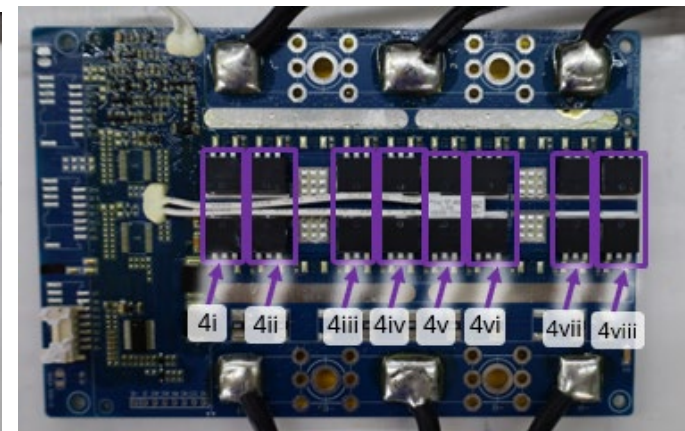
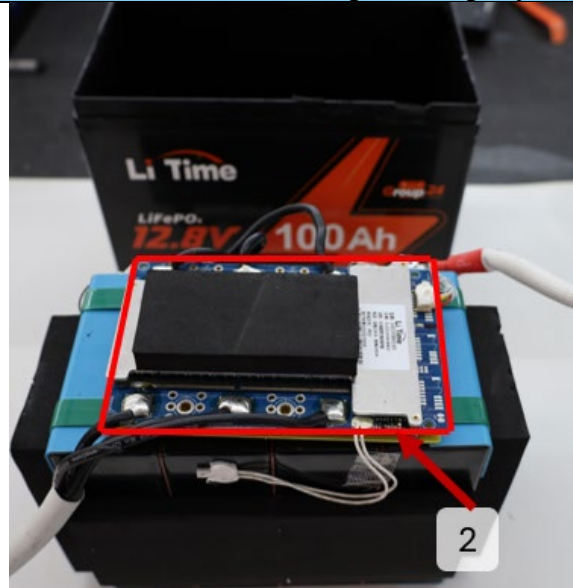
LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery





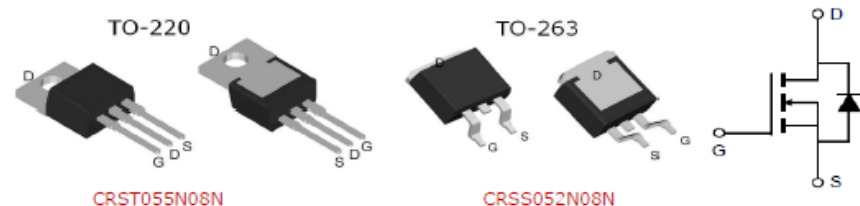
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|--|
| |  |
| <p>[12d-i] wherein said circuit board comprises a solid state switching apparatus comprising a plurality of pairs of solid state switches with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches,</p> | <p>The LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery includes said circuit board (2) comprises a solid state switching apparatus. The solid state switching apparatus comprising a plurality of pairs of solid state switches (4) with one pair of solid state switches connected in a parallel configuration to another pair of solid state switches (4i-4viii).</p> |

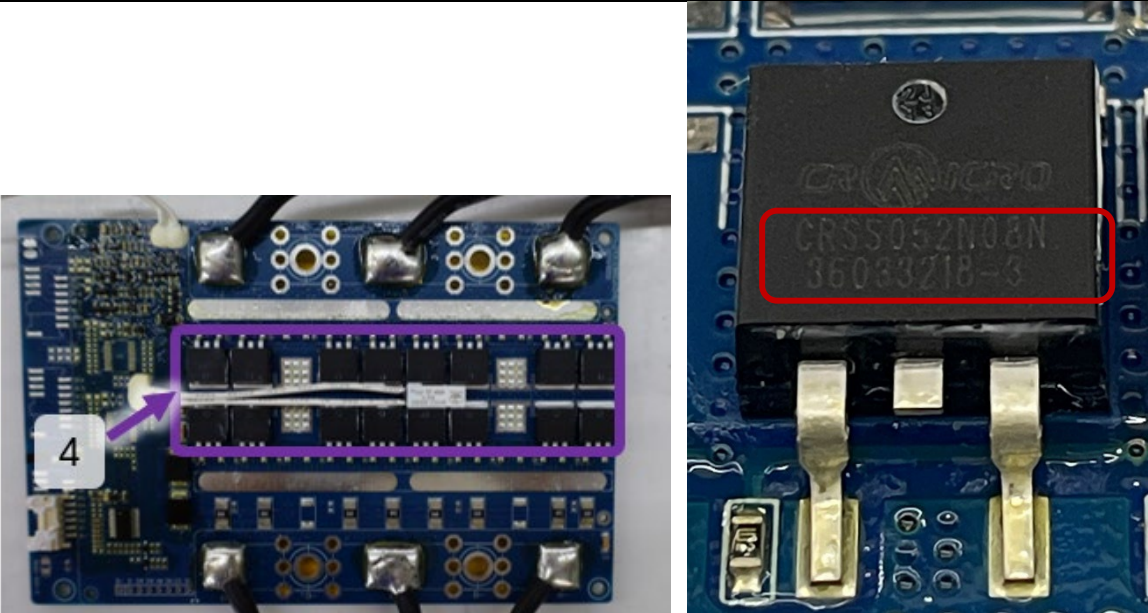
US9,954,207 Claim Element


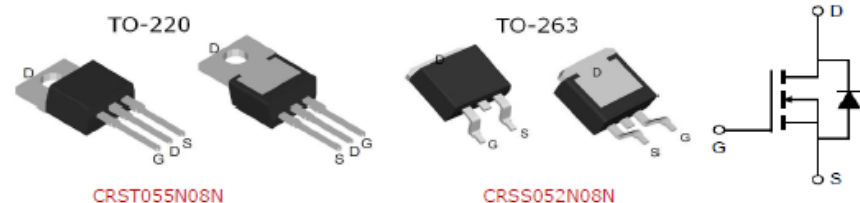
LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery



| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
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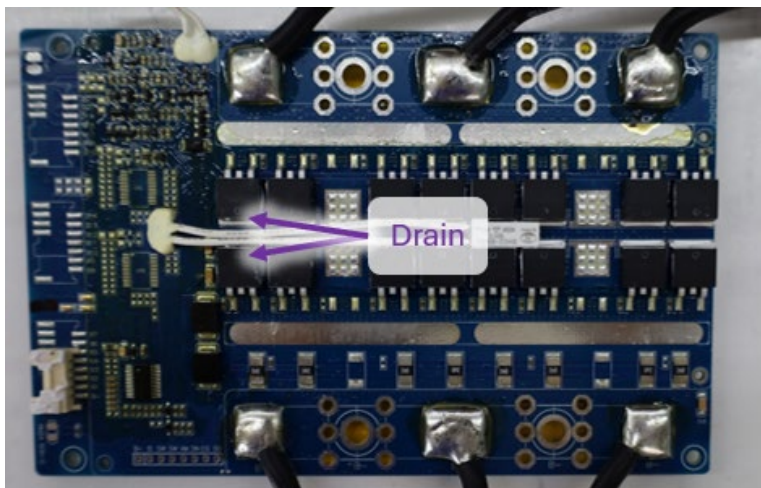
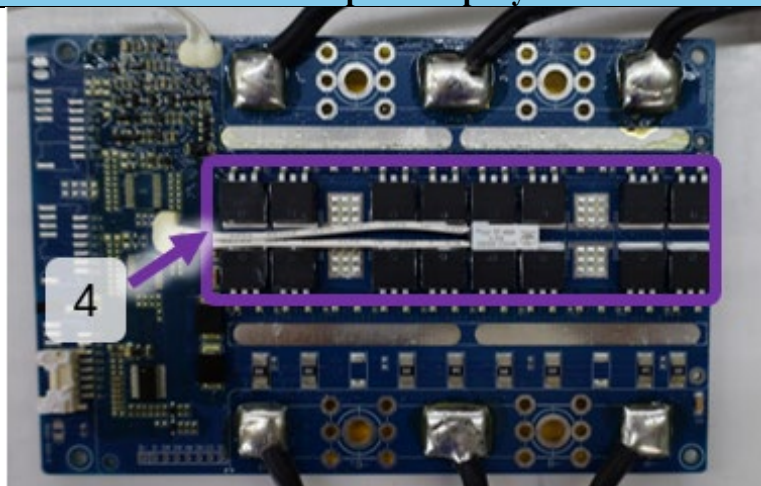
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery | | | | | | |
|--|---|----------|-----|--------------|-------|-------|------|
| | <div>  <p>华润微电子(重庆)有限公司</p> </div> <div> <p>CRST055N08N, CRSS052N08N</p> </div> <div> <p>SkyMOS1 N-MOSFET 85V, 4.6mΩ, 120A</p> </div> <div> <p>Features</p> </div> <div> <ul style="list-style-type: none"> • Uses CRM(CQ) advanced SkyMOS1 technology • Extremely low on-resistance $R_{DS(on)}$ • Excellent $Q_g \times R_{DS(on)}$ product(FOM) • Qualified according to JEDEC criteria </div> <div> <p>Product Summary</p> </div> <div> <table border="1"> <tr> <td>V_{DS}</td><td>85V</td></tr> <tr> <td>$R_{DS(on)}$</td><td>4.6mΩ</td></tr> <tr> <td>I_D</td><td>120A</td></tr> </table> </div> <div> <p>Applications</p> </div> <div> <ul style="list-style-type: none"> • Motor control and drive • Battery management • UPS (Uninterruptible Power Supplies) </div> <div> <p>100% Avalanche Tested</p> </div> <div>  </div> <div> <p>Source: https://www.lcsc.com/datasheet/lcsc_datasheet_2304140030_CRMICRO-CRSS052N08N_C410924.pdf</p> </div> | V_{DS} | 85V | $R_{DS(on)}$ | 4.6mΩ | I_D | 120A |
| V_{DS} | 85V | | | | | | |
| $R_{DS(on)}$ | 4.6mΩ | | | | | | |
| I_D | 120A | | | | | | |
| <p>[12d-ii] each switch having a source and a drain, the switches of a pair of solid state switches being configured such that either the drains of the switches are connected or the sources of the switches are connected, and</p> | <p>Each switch of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery has a source and a drain.</p> | | | | | | |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---------------------------|--|
| |  <p>The image consists of two photographs of a lithium battery's internal circuitry. The left photograph shows a blue printed circuit board (PCB) with various electronic components. A purple rectangular box highlights a row of components, and a white box containing the number '4' with a purple arrow points to the first component in this row. The right photograph is a close-up of a black MOSFET component. A red rectangular box highlights the markings on the component, which read 'CRS5052N08N' and '36033218-3'.</p> |

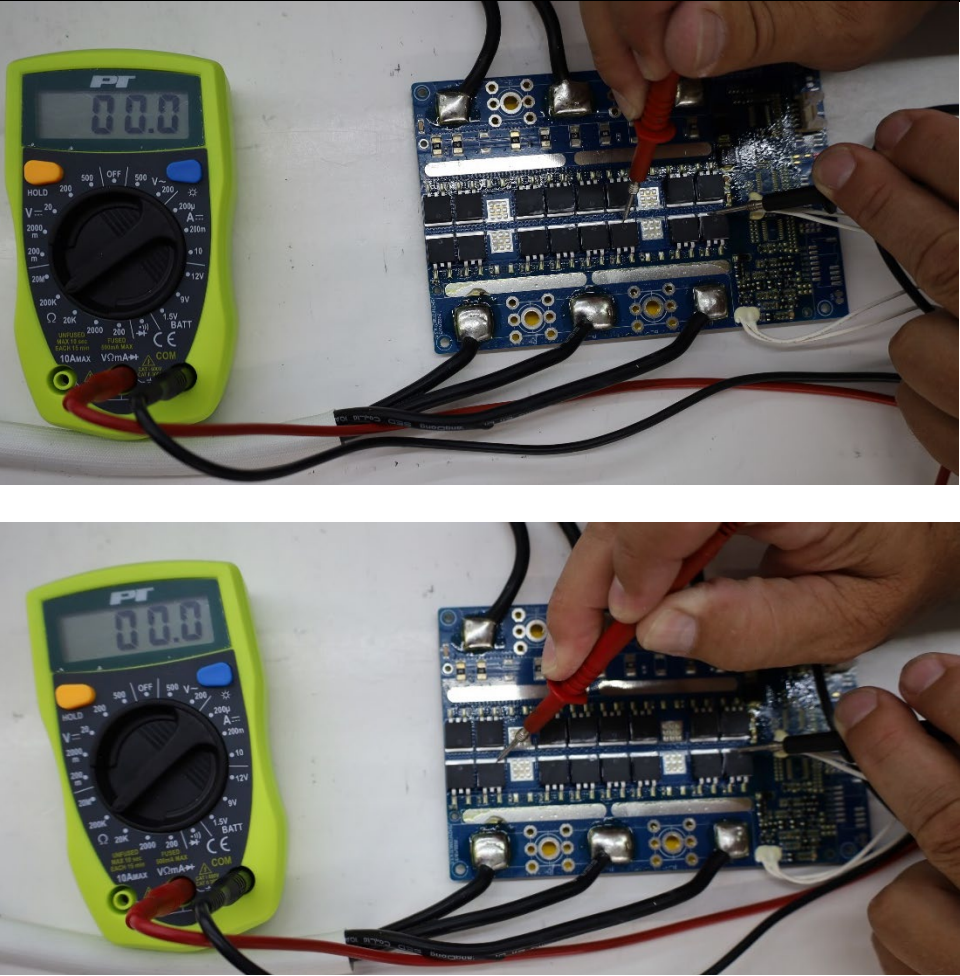
| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery | | | | | | |
|---------------------------|---|----------|-----|--------------|-------|-------|------|
| | <div>  <p>华润微电子(重庆)有限公司</p> </div> <div> <p>CRST055N08N, CRSS052N08N</p> </div> <div> <p>SkyMOS1 N-MOSFET 85V, 4.6mΩ, 120A</p> </div> <div> <p>Features</p> </div> <div> <ul style="list-style-type: none"> • Uses CRM(CQ) advanced SkyMOS1 technology • Extremely low on-resistance $R_{DS(on)}$ • Excellent $Q_g \times R_{DS(on)}$ product(FOM) • Qualified according to JEDEC criteria </div> <div> <p>Product Summary</p> </div> <div> <table border="1"> <tr> <td>V_{DS}</td><td>85V</td></tr> <tr> <td>$R_{DS(on)}$</td><td>4.6mΩ</td></tr> <tr> <td>I_D</td><td>120A</td></tr> </table> </div> <div> <p>Applications</p> </div> <div> <ul style="list-style-type: none"> • Motor control and drive • Battery management • UPS (Uninterruptible Power Supplies) </div> <div> <p><i>100% Avalanche Tested</i></p> </div> <div>  </div> <div> <p>Source: https://www.lcsc.com/datasheet/lcsc_datasheet_2304140030_CRMICRO-CRSS052N08N_C410924.pdf</p> </div> <div> <p>The switches of a pair of solid state switches of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery are configured such that the drains of the switches are connected.</p> </div> | V_{DS} | 85V | $R_{DS(on)}$ | 4.6mΩ | I_D | 120A |
| V_{DS} | 85V | | | | | | |
| $R_{DS(on)}$ | 4.6mΩ | | | | | | |
| I_D | 120A | | | | | | |

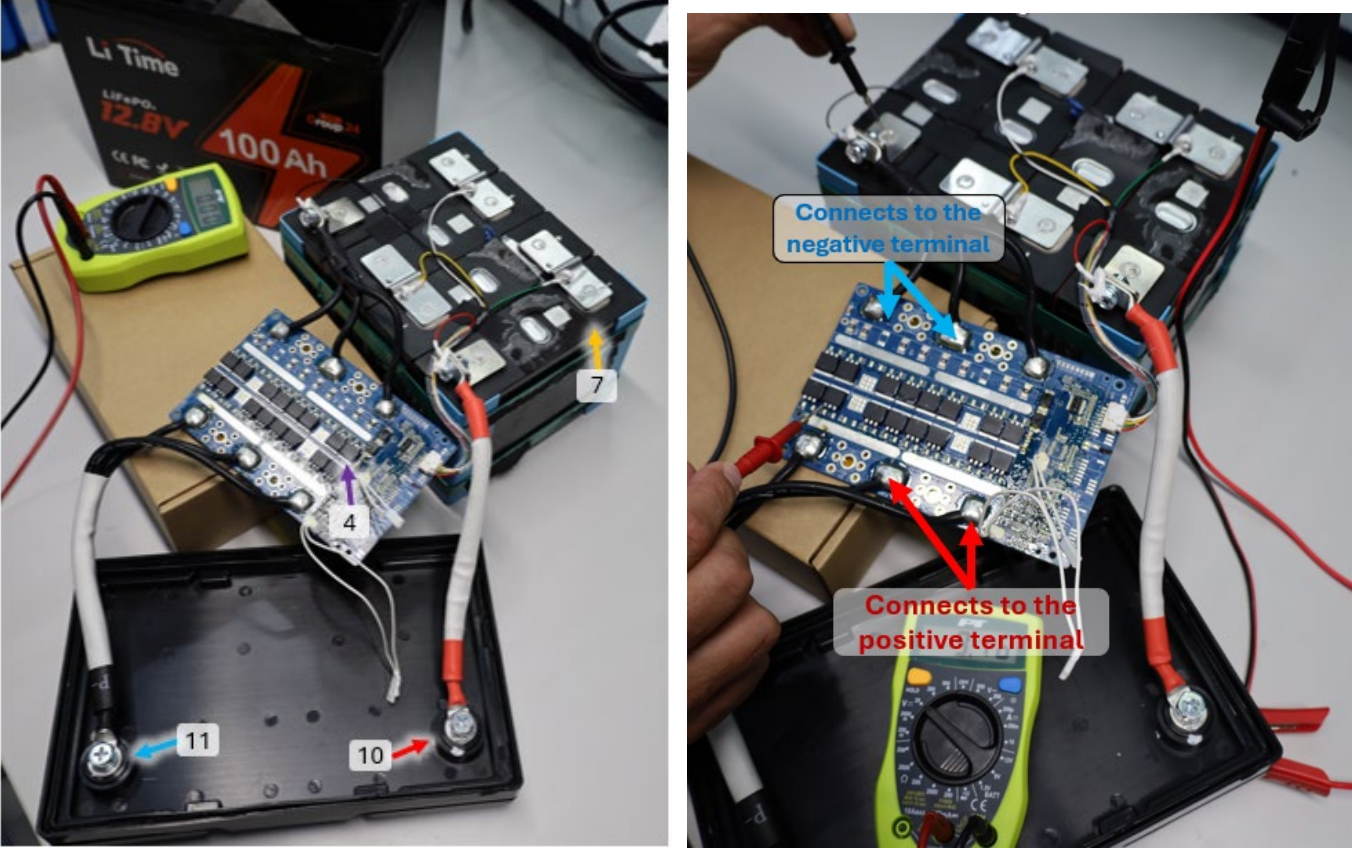
US9,954,207 Claim Element

LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery



For example, as demonstrated by testing the electrical continuity using a multimeter, the drains of the switches of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery are connected, as shown by the nominal resistance measured between the drains of opposed MOSFETs.

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|---|
| |  |
| <p>[12d-iii] said parallel configuration being connected with one or more cells between the positive and negative terminals,</p> | <p>The parallel configuration of solid state switches of the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery are connected with one or more cells between the positive and negative terminals.</p> |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|--|---|
| |  |
| <p>[12e] wherein a total discharging amount of each lithium-based cell in the battery pack is from 3 Ah to 2000 Ah, and charging voltage per one cell is 2.0 to 4.2 V.</p> | <p>The total discharging amount of each lithium-based cell in the LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery is from 3 Ah to 2000 Ah (e.g, 100Ah), and the charging voltage per one cell is from 2.0 to 4.2 V (e.g., 3.3V).</p> |

| US9,954,207 Claim Element | LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery |
|---------------------------|--|
| | <div>  </div> <div> <p>-54%</p> </div> <div> <p>⚡ 【Extra 5% Flash Sale】 LiTime 12V 100Ah Group 24 Deep Cycle LiFePO4 Lithium Battery ★★★★★ 41 reviews</p> </div> <div>  </div> <div> <p>Affordable BCI group 24 deep cycle battery, Compatible with All Types of RVs on the Market</p> <ul style="list-style-type: none"> • 2/3 Lighter, 1/4 Smaller, 2X energy of 12V100Ah Lead-Acid battery • 1280Wh of Energy, 1280W of Output Power • 8X Higher Mass Energy Density (60.95Wh/lbs VS. 7.23Wh/lbs of Group 24 AGM Battery) • EV Grade-A Cells, 4000+ cycles @100%DOD • LiTime's 100A BMS (over-charging, over-discharging, over-current, over-temperature, and short-circuit protection) • 100A Continuous Discharge/Charge Current, 400A/1S Continuous Discharge Current • 10+ Years Lifespan & 5 Years Warranty • 20.48kWh Expandable Energy (Max. 4P4S) • 10X Charging Efficiency, 2X Operating Time • Suitable for RVs/Camping/Trolling Motor/Lawnmower/Solar/Home Storage/Off-grid • IP65 Waterproof • Clean/Eco-friendly/Cost-effective • Fast Delivery & Excellent Service • Low TCO & Zero Maintenance Fee </div> <div>  </div> <p>Source: https://www.litime.com/products/12v-100ah-group-24-lithium-battery</p> <div>  </div> |